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FROM

EXPERIMENT STATIONS

SEASON 1955-1956

TANGANYIKA TERRITORY
EASTERN PROVINCE

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TANGANYIKA TERRITORY
EASTERN PROVINCE
PROGRESS REPORT FOR THE SEASON 1956

BY

R. SMITH.

Cotton Season.

Planting: February to April.

Picking: July to December.

Legal uprooting dates by districts:

Kilosa, Bagamoyo, Kisarawe and Morogoro (Duthumi)	15th November.
Morogoro (except Duthumi) and Ulanga ...	30th November.
Rufiji	31st December.

Rainfall at Ilonga

Month	*Rainfall in inches*
January	4·92
February	6·92
March	5·77
April	16·53
May	0·51
June	0·25
July	0·00
August	0·00
September	0·22
October	0·00
November	0·49
December	9·79
	45·40

Introduction.

Eastern Province.

Throughout the Province the season commenced with early heavy rains, making preparation of gardens difficult and resulting in late planting. In some areas, flooding or the rate of growth of natural vegetation was so great that food crops were not planted, and cotton was still being planted in late May. In the drier areas of the Province (i.e. Bagamoyo) there was an early planting rain in February and no more until April; the rains stopped in early May.

Insect attack varied in the different areas, being very heavy in the Mwaya area and Kilosa district and relatively light in Kissaki and Bagamoyo. Pink bollworm, American bollworm and spiny bollworm were the main pests. Jassid was not serious, probably due to late planting generally.

The best methods of cotton cultivation in the Eastern Province are now reasonably clear cut. Final confirmation should be obtained with district plot trials in the various districts, next year.

Recommendations are: February planting with a jassid resistant variety, treated weekly with 10 lb. DDT/BHC dust, or equivalent spray, during the insect attack in April, May or June; spacing at one foot between plants, one plant per hole, rows 3 feet apart.

It should be emphasised that only early planting with the use of insecticide will give increased yields. Early planting without dusting or late planting with dusting will not give better crops.

No increase in production can be expected until widespread use of insecticide is practised. This season the Department of Agriculture ran demonstration trials which have helped considerably to convince growers. Numbers of growers are buying dust to use next year, especially in areas where bush schools were conducted in conjunction with demonstrations.

Ilonga.

The climatic conditions were good. Rainfall was adequate and well distributed.

The cotton plots were planted next to a large acreage of maize mainly to see if control was effective with routine 10% DDT/3% BHC dusting under conditions of extremely heavy bollworm attack.

Jassid was present in large numbers and enabled the breeder to select jassid resistant types easily. Most of the answers to cotton growing in Eastern Province have been confirmed with this season's work. More time can now be spent on plant breeding.

Sowing distance, time of planting and comparison of dusted and not dusted plots will be tested at centres in the Province next year to give accurate confirmation of the Ilonga conclusions for the Province generally.

The entomologist traced the relationship of pest attack, pest control and crop growth. He showed that spraying was more effective than dusting but not as convenient for general local application. The effectiveness of using dusts is reduced when rain washes the dust from the plant. Smaller quantities of insecticide were not as effective as larger doses for either dust or sprays, resulting in high costs for effective control. Next year, in an attempt to reduce costs, he proposes to use heavier weekly applications of insecticide during the build-up and peak period of bollworm populations and less during the decline.

Cotton Cultivation Trials.

Time of Planting.

The results of trials carried out in recent years are summarised in Table 1.

TABLE 1.

COMPARATIVE % YIELDS FROM DUSTED TRIALS.

Planting date	*Ilonga* 1954	1955	1956	*Kissaki* 1956
February	100	100	100	100
March	60	39	54	91
April	2	2	—	63

Spacing.

Randomized block trials have been carried out in recent years at six different spacings. The comparative yield figures in Table 2 show that in general close spacing gives the highest yields.

TABLE 2.

COMPARATIVE % YIELDS FROM DUSTED TRIALS.

Planting date	*Ilonga* Mar. 1954	Feb. 1955	Mar. 1955	Feb. 1956	Mar. 1956	*Kissaki* Feb. 1956	Mar. 1956	Apr. 1956
Spacing and no. of plants per hole								
6 ins. 1	99	89	—	84	100	—	—	—
12 ins. 1	100	100	100	85	77	100	100	100
18 ins. 1	89	91	—	—	—	—	—	—
24 ins. 2	—	84	82	90	66	—	—	—
36 ins. 2	70	87	61	100	47	86	87	88
36 ins. 3	—	—	—	83	62	—	—	—

Interplanting.

Cotton gave much poorer yields when interplanted with maize, but with short strawed sorghum the sorghum stands were very poor and the yield of grain low, 390 lb./acre. This reduced the competition effects and the cotton yield was as high as that in the pure stand of cotton. Similarly beans, when interplanted, were completely smothered by cotton, whose yield equalled that of the pure stand cottons.

Levels of Cultivation.

The object of this trial was to compare the economic returns from cotton cultivated at various levels of husbandry with and without dust.

This trial was planted at the base of the foothills and it is presumed that ample moisture was available from rainfall and seepage to enable the cotton to grow equally well in all treatments, except the badly neglected variant. A factor affecting the results was that February planted cotton grew more vigorously but dusting started a little late. Consequently, bolls were lost and growth was rank, resulting in a similar yield to the smaller, timely-dusted, March planting, where the full potential yield was picked.

TABLE 3.

LEVELS OF CULTIVATION.

Randomised blocks, 2 trials, 1 planted on 10th February, 1 planted on 8th March, each 8 replications. 4 dusted once weekly from 17/4 to 18/6. Plot size 1/30·25 acre.

Treatments.

1. Clean throughout, thinned early, 21 days after the February planting and 12 days after the March planting.
2. Weeded and thinned 14 days after treatment 1. Then weeded throughout the rest of the season.
3. Weeded and thinned 28 days after treatment 1. Then clean weeded throughout the rest of the season.
4. Weeded and thinned once 10 weeks after planting.

		Seed cotton yields in lb. per acre.			
	No. of	*February planted.*		*March planted.*	
Treatment.	*weedings.*	*Dusted.*	*Not dusted.*	*Dusted.*	*Not dusted.*
1	5	1,023	25	1,126	Nil
2	4	1,120	9	1,054	Nil
3	3	1,002	5	943	Nil
4	1	491	6	660	Nil
Sign. Diff. P=0·5		211	N.S.	185	N.S.
S.E.		± 97	—	± 85	—

An increase of 140 lb. seed cotton per acre is needed to cover the cost of dusting.

Dusting.

All the above-mentioned trials had dusted and non-dusted plots, 10 lb. dust being applied weekly for 9 weeks. As can be seen from Table 4, if dust had not been used no cotton would have been picked at Ilonga.

TABLE 4.

COMPARISON BETWEEN DUSTED AND NOT DUSTED TREATMENTS. ILONGA, 1956.

Trial.	*Mean yield in lb./acre seed cotton.*		*Flared squares (damaged buds) per acre on 19th May 1956.*	
	Dusted.	*Not dusted.*	*Dusted.*	*Not dusted.*
Sowing distance & time of planting.				
February planted	980	Nil	30,000	56,000
March planted	462	Nil	9,000	38,000
Interplanted trial.				
February planted	1,571	6	18,000	60,000
Cultivation trial.				
February planted	1,071	12	13,000	47,000
March planted	1,024	Nil	10,000	34,000
Total acreage	6 acres	4 acres	Average plant population 15,000 per acre.	

A dusting trial at Kissaki also gave good though not such spectacular results, dusted plots averaging 1,570 lb. seed cotton per acre over three dates of sowing and non-dusted plots averaging 799 lb.

PLANT BREEDING.

With the picture of cotton cultivation reasonably clear, the type of plant required can be more easily assessed, in regard to field characters. Jassid resistance is needed, and a short plant of compact habit with high yields. This, from results of yield trials and measurements of daughter strains, has enabled the range, type and number of selections and parent bulks to be cut considerably for next year.

In the coming season, it is hoped to plant progeny rows to define more accurately the value of lint indices, combed lint length and ginning outturn as selection characters, and to establish whether a plant with a large number of small bolls is better than a plant with fewer, larger bolls in relation to dusting in insect attack. All assessments will be made on February planted dusted cotton on Ilonga, on the assumption that this is to be the usual method of cultivation in the Province.

Next year, 47/10 will be distributed in the remaining areas of Eastern Province. 47/10 lacks jassid resistance; there is urgency, therefore, in producing a new strain so that the risk of heavy jassid damage in early planted cotton is minimised. With dust being used more widely, and with the present recommendation for February planting, the need is pressing. Of the strains tested at district plots this year, several are fairly good for most characters. Therefore, as an interim measure, a mixture of several of these strains (i.e., a multiline issue) will be grown and tested at Ilonga and in district plots next year. If suitable, initial bulking can then start.

Variety Trials.

Main Variety Trial.—This trial of 9 strains in a 3 x 3 balanced lattice, 4 replications, plot size 1/145·2 acre, was planted at Ilonga, Mwaya, Kissaki and Msoga. Yield figures are shown in Table 5.

TABLE 5.

ILONGA AND DISTRICT VARIETY TRIALS.

	Yields in lb./lint per acre.				
	Ilonga.		*Mwaya.*	*Kissaki.*	*Msoga.*
	Dusted.	*Not dusted.*	*Dusted.*	*Dusted.*	*Dusted.*
Date planted	22/2/56	22/2/56	10/3/56	2/4/56	3/4/56
Strains					
51/61	609	78	534	345	145
111	664	91	515	410	136
110	708	77	518	375	153
53/122	652	81	570	366	194
128	720	87	471	422	162
192	734	91	549	346	142
193	737	62	471	396	172
125	699	78	485	358	167
Local	510	45	421	347	151
Sign. Diff. (P=·05)	127	25	107	N.S.	37
S.E.	± 55	±11	± 47	± 41	± 16

All strains have some hairiness on the leaves but none has the amount required for resistance against heavy jassid attack.

Ginning percentages of all strains were as good as that of Local (30·4%) at all sites; there were no significant differences between combed lint lengths. However, owing to drought, Msoga provided the hardest conditions and lint samples from this plot have been sent for spinning tests.

Seed coat damage counts were below 20% for all strains. Blackarm was negligible.

53/122, 53/128 and 53/125, all daughter strains of 51/77, have good spinning reports in tests, and further selection has been carried out in this group for improved jassid resistance.

Trials of 1954 Selections.—Two 7 × 7 balanced lattices (plot size 1/290·4 acre) were planted on 23rd February to test the remaining 1954 selections. Both trials were badly attacked by pests and full potential yields were not realised, although control with dusts was adequate. One trial tested 42 selections against the original parent types and Local. Yields were significantly higher than for Local, some being roughly double, and the lint lengths of most strains were longer than that of Local. All the later selections had better jassid resistance than the parent types or controls. Ginning percentages were low. A few selections gave lower ginning outturn than Local (27·8%) but none lower than 47/10 (25·4%). The low ginning percentages were probably due to the season and the site (rich alluvium soil). In the previous season, all the selections had ginning percentages over 30%. The lint index for Local was 3·8, but 3·2 for 47/10. Some of the selections gave lint indexes of up to 4·6.

In the other trial, the remaining forty-eight 1954 selections were tested against Local. The average yield was 632 lb./acre, part of the crop being taken by American and spiny bollworms. The general trend was similar to that in the former trial. Yield differences were greater, three strains producing twice as much cotton as Local, partly owing to a shorter habit allowing better control with insecticide. Ginning percentages were even lower than those previously mentioned—the ginning percentage of Local being 26·8%. Fourteen of the selections had lower ginning outturns than this.

From a total of ninety strains tested, fifty-three will be tested again next year. The number of original parent types is now twenty. Half the remaining 1954 selections are derived from four original parent bulks, 51/111, 51/77, 48/69 and Local.

Trial of 1951 and 1953 Selections.—(4 × 4 balanced lattice, plot size 1/290·4 acre). This trial, planted on 13th February, was badly attacked by pink, American and spiny bollworms and yields were poor; differences were not significant. Rank growth and poor grade cotton

made observations and measurement of seed characters difficult. Four strains have been kept as parents on the performance of progenies selected in previous years.

1956 Selections.—216 new selections were made this season.

Selection of Irrigation Types.—167 strains were grown in small plots and rigorous selection was done to reduce the numbers. From information obtained over the past two seasons 32 strains have been kept for planting at Lumemo in the Kilombero valley next year at the Tanganyika Agricultural Corporation pilot irrigation plot.

Strains were discarded on jassid susceptibility, low ginning outturn and short lint lengths.

Of the imported types, the Sudan strains were attenuate in habit, slow in fruiting, poor in opening, and jassid susceptible. Three, however, will be planted under irrigation next year. Of the Uganda types, several had poorer lint than that required, and others suffered from jassid; one has been kept for irrigation tests. Of the Ukiriguru strains two have been kept but it is doubtful if the lint will be comparable with that of the local selections.

Next year, when material has been grown under irrigation and spinning test reports have been obtained, the picture should be clearer.

Entomology.

BY

E. W. VALENTINE.

American Bollworm (*Heliothis armigera*).

A small number of larvae were found on pigeon pea, okra, and tomato during September, and then none at all in October. However, the weather from mid December seems to have been particularly favourable for the rapid build-up of American bollworm. In late November, moths which presumably came from emergences after the first shower of rain began to lay on irrigated maize. Laying continued till the middle of December. From then on it rained almost continuously till March, so that there was a constant supply of food plants—volunteer maize, early planted maize and groundnuts—on which this infestation could develop before the cotton became attractive. There was a slight decrease early in February but an increase again later in the month.

The first egg laying in cotton took place in the second week of February, on cotton planted on 16th January, and adjacent to volunteer maize. In the main crop (February planted) eggs and larvae were found in the third week of March. Egg laying continued until the beginning of June, at which time the larval population in unprotected

cotton reached a maximum (approximately 20,500 per acre). Then the number declined rapidly so that very few larvae were found in cotton in July. In this month the infestation transferred first to chickpea and then to pigeon pea. As the chickpea crop was sparse the population was relatively low, but in the pigeon pea area of 40 acres the numbers were much higher than in any other crop. Collections made in early August, which were mainly of 6th instar larvae, showed that at least 76% were parasitised by a Tachinid.

From this time till the end of September a few specimens were found in pigeon pea and chickpea which had not yet dried and also on riverside maize.

Spiny Bollworm (*Earias spp.*).

This pest was first recorded in cotton in March, and remained at a relatively low level until the end of May. It increased gradually in June despite insecticide treatment, and even though there was a slight decrease after the treatment period there was another rise in numbers reaching a maximum just before picking started. There was little difference in the level of infestation in different treatments, except in the higher application of spray.

Pink Bollworm (*Platyedra gossypiella*).

Larvae of this pest were found in cotton throughout the whole season, from first flowering to the opening of the last bolls, and it was the heaviest attack experienced for many years. Late and incomplete uprooting and standover crops were certainly responsible for this situation. Some volunteer and standover plants in the vicinity of the station, examined in January/February, were heavily infested.

The earliest laying on the station took place during February, in cotton planted on 16th January. Counts taken in opening from the beginning of March, and during the maximum flowering period, showed that at least a quarter of the buds were infested. Pink bollworm were also present in February planted cotton throughout the season from the formation of the first buds, but not at such a high level as in the earlier crops.

Stainers (*Dysdercus spp.*).

D. intermedius was present in low and variable numbers, particularly during April and May. Staining was observed only in late fruiting plots.

Aphids.

In treated cotton, aphids were never of importance, and the infestation increased only in unprotected cotton late in the season. The colonies developing during the rains were largely controlled by fungus disease.

Jassid.

As in the previous season, jassid seriously reduced the yield of unprotected cotton. All insecticide treatments adequately controlled the infestation.

Insecticide Trial.

This was a trial using various formulations as sprays, and the 'standard' dust application, to test efficiency in the control of the main cotton pests and using equipment which might be adapted to African farming conditions.

The cotton was planted by machine on 13th February, weeded by machine on 5th March, thinned on 7th March, and subsequently weeded by hand. Insecticide applications were started on 25th April, when the flared square (damaged buds) counts exceeded one per plant.

Table 6.

Insecticide Trial.

Plot size: 1/10th acre. Layout: randomised blocks. Replications: 5. Spacing: single plants at 1 ft. spacing in 42 in. rows. Strain: 47/10. Equipment: Four Oaks Ross knapsack sprayers, standard model: Swaine dust blower. Insecticide applied weekly for 8 weeks.

Treatment.

A. ¼ lb. DDT per acre per application, spray
B. ¼ lb. DDT + ¼ lb. BHC per acre per application, spray } In 6 gallons water per acre
C. 1 lb. DDT + ¼ lb. BHC per acre per application, spray
D. 1 lb. DDT + 0·3 lb. BHC per acre per application, dust
E. Control

Summary of insect pest records during the period of insecticide application. Yields in lb. seed cotton per acre: pest and damage counts as numbers per 100 plants per week.

	Treatment DDT	BHC	*Flared squares*	*American bollworm*	*Spiny bollworm*	*Pink bollworm*	*Yield*
A.	¼ lb.		131	29·3	19·4	9·9	573
B.	¼ lb.	¼ lb.	141	36·1	16·8	5·6	650
C.	1 lb.	¼ lb.	68	16·3	8·0	4·7	1536
D.	1 lb.	0·3 lb.	168	44·5	17·8	6·5	742
E.	Control		338	87·4	30·5	9·9	166
	S.E.		7·85	3·07	6·59	0·38	6·39
	Sign. Diff. (P·05)		23·5	9·2	20·8	1·14	64

Jassid were present in the crop soon after planting, and increased in numbers until the start of insecticide applications, when they were adequately controlled in all treatments. American bollworm eggs were first recorded in mid March, i.e., one month after planting and before flowering. A few spiny bollworm larvae were also found at the same time but did not increase until May.

When spraying treatments were started the cotton had already reached over four feet in height, and continued to grow rapidly until at the end of the season plants were between six and seven feet high. This tremendous growth led to increasing difficulties in spraying operations, and was probably responsible for less efficient distribution of insecticide.

Observations on Pest Records.—1. There was no significant difference between A and B ($\frac{1}{4}$ lb. DDT and $\frac{1}{4}$ lb. DDT + $\frac{1}{4}$ lb. BHC) in flared squares, American and spiny bollworms, but there was a difference in the pink bollworm populations at the 1% level. The inclusion of BHC reduced the population to almost half that in the plots treated with DDT only. Counts of pink bollworms were made in opening flowers only, so that the actual populations would be greater than those shown in the table, especially in the controls in which most of the buds were damaged (by American bollworm) before flowering.

2. Treatment C, .1 lb. DDT + $\frac{1}{4}$ lb. BHC per acre per application as a spray, gave better control of all insect pests than any of the other treatments and very much better than the equivalent application as a dust.

3. Treatment D, 1 lb. DDT + 0·3 BHC per acre per application as a dust, gave adequate control, and although the pest counts indicate a less effective control, especially of American bollworm, than the lower rates of spray, the final yield was considerably higher.

Discussion.—The strain used, 47/10, is a very vigorous type, and this year when grown on good land reached a tremendous height. Some plants were over 7 ft. high at harvesting time, and many were lying on the ground. The size and height of plants led to difficulties in spraying operations.

The yields show that under these conditions spray is more efficient than the equivalent application of insecticide as a dust. The differences in yield between the spraying treatments were greater than was expected. This was probably because the overwhelming infestation of insects, from adjacent maize and large areas of unprotected cotton, was not adequately controlled by low rates of application to large plants. It is felt that the differences would have been proportionately smaller in shorter cotton, but this aspect will have to be investigated more thoroughly.

Economics of Treatments.—The following costings are based on the actual costs of the insecticides used in the experiment. Insecticides from other sources are in some cases very much cheaper.

TABLE 7.

Value of crop based on 57 cents per lb. for grade A seed cotton, and 20 cents for grade B. Costs and value in shillings per acre.

Treatments	*Seed cotton lb. per acre*	*Grade A %*	*Value of crop*	*Cost per acre*	*Profit per acre over control*
A	573	69·3	261/59	25/20	162/49
B	650	75·7	312/03	159/20	78/93
C	1536	85·2	791/18	234/80	482/48
D	742	83·3	377/06	80/00	223/16
E	166	66·3	73/90	—	

It will be seen from the table that although treatment C was the most expensive it resulted in the biggest profit, which seems to indicate that the higher the application—up to that level—the greater the profit. The yield from treatment B was significantly higher than that from treatment A, but its cost was considerably greater, so that the actual profit was much less.

The amount of BHC in both treatments B and C might well have been reduced, to bring down the cost without seriously reducing efficiency. This point will be investigated next season.

Dusting with 1 lb. DDT + 0·3 BHC per acre per application is the present recommendation for African growers.

Timing of Crop Protection.

TABLE 8.

EFFECT OF DELAY IN PROTECTION AGAINST INSECT PESTS.

Plot size: 1/40th acre. Spacing: single plants at 1 foot intervals, in 42 in. rows. Replications: 4. Planted: 13th February 1956. Variety: 47/10. Treatment: 1 lb. DDT + 0·3 lb. BHC per week as a dust. Equipment: Swaine dust blower.

Period of protection.	*Yield lb. seed cotton/acre.*
April 27th—June 22nd	1185
May 25th—July 20th	583
None	174

This small trial was laid out mainly to demonstrate the effect of a delay in the protection of cotton from insect pests. It is known that the cotton plant is capable of compensating fully for a loss of buds for periods up to three months. Under the prevailing local conditions, however, if protection is delayed the plant suffers not only from loss of buds, but also leaf and physiological damage by a number of insects, particularly jassid, so that when protection is afforded the plant is not able to compensate to the same extent. The results of this trial strengthen the case for early protection.

Development of Cotton in Relation to American Bollworm Attack.

An examination of the records of American bollworm in cotton at Ilonga over the past 12 years shows that up till 1949 the attack began in the second or third week of May, reaching a peak in the second or third week of June and then decreasing till the end of July. In the following five years the attack gradually became earlier, starting at the beginning of May or end of April. The peak varied from the first to the third weeks of June, the population curve tailing off again to the end of July. In the past two years, with generally earlier planting, in mid-February rather than late March, the initiation of the infestation was slightly earlier still and the peak advanced to the beginning of June. There has also been a gradual increase in the level of infestation from 1944.

In order to find some relation between development of the crop and expected time of infestation by American bollworm, records were taken of the development of cotton planted at fortnightly intervals from mid December until late March. Weekly counts were made of the number of buds, flowers, bolls, and open bolls. Rainfall from 13th December until the middle of March was almost continuous, so that it was possible to plant at regular two weekly intervals.

Table 9 summarises the information obtained.

TABLE 9.

SUMMARY OF DEVELOPMENT RECORDS.

Figures of buds and bolls are as totals per plant. Plot size 5 rows of 10 plants at 1 ft. intervals.

Dates of			*Weeks of*		*Totals of*		*Approx. s/c lb. p.a.*	*% saleable cotton*
Planting	*First flower*	*First opening*	*Flower*	*Harvest*	*Buds formed*	*Bolls harvested*		
17/12	11/2	14/4	20	21	96	30	2380	71·5
30/12	28/2	28/4	19	18	90	26	2030	82·5
14/1	10/3	5/5	15	15	112	37	2580	85·0
28/1	17/3	12/5	14	15	83	27	2100	93·5
11/2	3/4	9/6	13	12	73	27	2320	94·5
25/2	16/4	16/6	11	11	47	18	1900	96·5
10/3	5/5	7/7	10	9	20	10	1070	98·0
24/3	28/5	28/7	7	6	16	6	510	100·0

The records can conveniently be divided into two groups, one from the first four plantings, and the other from the later four plantings.

Group 1.—(a) There were two flowering peaks with a complete break of two weeks (in April) in the first planting.

(b) Bolls began to open before the expected cessation of rain by six, five, four and three weeks in successive plantings.

(c) Rapid shedding of small bolls took place in early April after a dry spell in March.
(d) First flowers were infested by pink bollworm.
(e) The last flowers were formed in each plot within two weeks of each other.

Group 2.—(a) Only one flowering peak, the period of flowering becoming more concentrated with each successive planting.
(b) Difference in times of last flowers only two weeks.
(c) No bolls opened during rain.
(d) Percentage of saleable cotton greater than in group 1.
(e) Loss by shedding tended to be less than in group 1.

The flowering curve which most nearly approximates to the pattern of infestation by American bollworm (as recorded in the field in cotton planted in mid February this year) is that of the plot planted on 25th February. That is, the increase in the number of small bolls took place at the same time as the bollworm infestation was building up, whereas in earlier plantings boll formation was slightly in advance of the bollworm build up.

There are many factors involved in the determination of an optimum planting period, but the answer seems to be to plant early enough to allow the plant to form some crop before the expected time of infestation by American bollworm, but to avoid possible infestation by pink bollworm and damage by rain, bacteria and fungi to opening bolls.

However, if there is any advantage in planting early to minimize damage to the first bolls, the entry of American bollworm cannot be avoided, so that the crop must be protected when infestation does take place.

African "Cotton Club" Plots.

Three African farmers cultivating cotton on the boundary of the Research Station were given technical assistance in the control of insect pests. The fields, of 1 acre, 2 acres and $2\frac{1}{4}$ acres in extent, although rather late planted, were well cultivated throughout the season. Insecticide was applied with a standard Four Oaks Ross knapsack sprayer, at the rate of $\frac{1}{4}$ lb. DDT per acre for four weeks and $\frac{1}{4}$ lb. DDT + $\frac{1}{4}$ lb. BHC for the second 4 week period. This was regarded as the minimum rate which could be recommended, but unfortunately it was not enough to control the heavy attack, particularly of pink bollworm, and the yields were disappointingly low.

The cost of insecticide (40/- per acre) was equivalent in value to about 80 lb. of grade one seed cotton, so that there was little profit from the yields of 300 to 420 lb. seed cotton per acre. However, the

cultivators themselves are satisfied with the results, as they were much better than they are used to. They intend to increase the size of their plots and at least double the application of insecticide in 1957.

Appendix.

Summary of Strains.

Eastern Province Local	The original commercial cotton in the Province, mainly of Uganda Local origin.
47/10	A selection from Local due to replace Local completely in the Province in the coming season.
44/ to 48/ strains	All selections made before 1951 from Eastern Province Local.
51 strains	Strains selected in 1951 from pre 1951 strains.
53 strains	Strains selected in 1953 from pre 51 strains, 51 strains and Eastern Province Local.
55 and 56 strains	Strains selected in 1955 and 1956 from pre 51 strains, 51 strains, 53 strains and Eastern Province Local.
Irrigation types	Strains selected for good lint characters, for possible irrigation schemes, from Eastern Province Local, Lake Province, Uganda and Sudan.

Summary of Practical Methods of Insecticide Application.

Dust	10% DDT plus 3% BHC applied once weekly at 10 lb. per acre. Applied with Swaine dusters or rotary dusters, at the onset of insect attack.
Spray	DDT (emulsion) at the rate of 1 lb. DDT (in 6 gallons of water) per acre per week, plus ¼ lb. BHC if required for control of aphid, using knapsack sprayers. Lower rates than the 1 lb. DDT still give adequate control, but effectiveness decreases below that rate.

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